



Kansas duck and geese hunters display their take in the 1940s.

LEARNING THE HARD WAY:

Early Water Control Projects at Cheyenne Bottoms Wildlife Area

by Douglas S. Harvey

In the mid-1890s farmers in Barton County, Kansas, looking for ways to combat the devastating effects of a series of dry years, turned their attention to the nearby Cheyenne Bottoms wetland. This “sink” represented a ready-made holding tank that could, it was thought, maintain a steady supply of water to the area’s agricultural operations. To this end a ditch was dug from the Arkansas River to the Bottoms, located just north of the Great Bend in the river, but the venture was quickly litigated into extinction, assisted by the return of wet weather and the resulting temporary decline in the need for irrigation water. When in the late 1920s the Bottoms filled to overflowing during a cloudburst, Kansans again turned their attention to the wetland, this time with the intention of developing it as a wildlife refuge for migratory waterfowl and a shooting ground for local hunters.

These early efforts to channel water into and out of Cheyenne Bottoms caused significant, lasting, and sometimes quite unexpected changes to its ecosystem. Often attempts to manage the Bottoms environment were made without fully understanding their potential effects. Hindsight and seven decades of experience have taught that what would come to be known as the Cheyenne Bottoms Wildlife Area—the largest wetland in the central plains of North America, encompassing over 40,000 acres, of which about 25,000 are managed—is much more complex than early planners thought. Its existence is vital to the hundreds of thousands of migratory fowl who depend upon it as a rest and refueling stop on their long journey between nesting grounds in Canada and their winter range in the tropics. A previous *Kansas History* article, “Creating a ‘Sea of Galilee’: The Rescue of Cheyenne Bottoms Wildlife Area,” described how this “Jewel of the Prairie” was rescued from drainage and oblivion in the 1920s and 1930s. This study is a description of events at Cheyenne Bottoms that brackets the

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previous article and surveys the problems encountered as a result of attempts to manage a large and complex wetland.¹ By trying to control the flow of water at the Bottoms, managers had to deal with a host of outcomes that no one had the experience to predict.

The hard lesson of this history is that the well-intentioned and largely successful efforts of wildlife scientists involved with making the Bottoms a perennial wetland have often led to unintended consequences that then demanded further remedial action. It is a pattern seen elsewhere on the Great Plains. The decision to manipulate the water at Cheyenne Bottoms was only one in a series of profound ecosystem alterations brought to the plains by human beings, alterations that have been well documented in the scholarly literature. The number of animals living on the plains, including tens of millions of bison, as well as cougars, elk, bears, black-footed ferrets, prairie dogs, wolves, grouse, prairie chickens, and other former residents, has been reduced drastically and in some cases species have been eliminated altogether. This profound depopulation of animals native to the Great Plains does not change the fact that the region remains a viable ecosystem, albeit one that is less stable. Humans, cattle, hogs, and, to a lesser degree, Redwing Blackbirds, Dickcissels, Horned Larks, Lark Buntings, Ring-necked Pheasants, and other species have flourished at the expense of the historically dominant species. Indeed, just the introduction of the horse to the Great Plains in the seventeenth and eighteenth centuries had profound implications for the ecosystem relationships of the region.²

What happened at Cheyenne Bottoms in central Kansas was the same thing that happened on the Great Plains from the tall grass savannahs of Ohio and Indiana to the short grass table lands of the Staked Plains in New Mexico: an ecosystem was altered before it had ever been studied. A lack of knowledge, which resulted in a failure to understand the consequences of direct action, eventually hampered efforts to alter the Cheyenne Bottoms ecosystem in favor of migratory fowl. It gave rise to the false assumption that yearly temperature and rainfall "averages" over a rela-

tively short period of time provided an accurate picture of "normal" conditions and not to a false normality that belied sometimes-wild fluctuations in precipitation. In addition, the desire on the part of local officials to quickly execute a simplistic ecosystem manipulation plan for the sake of hunting revenues, among other things, contributed to the rather difficult learning experience that would be Cheyenne Bottoms management.

The first private efforts at digging irrigation ditches and setting up diversion dams in the Arkansas River began in the early 1870s near Fort Lyon, Colorado. In 1871 George Swink arrived at Rocky Ford on the Arkansas, twenty miles above old Bent's Fort, and took up ranching. He soon bought into a mercantile business at the ford with Asahel Russel and within a few years moved the business three and one-half miles downstream to the present-day location of Rocky Ford, Colorado, on the Atchison, Topeka and Santa Fe Railroad. Swink began noticing that plants grew better in the spot where he threw wastewater from his kitchen window. After a series of experiments with garden beds, Swink and his neighbors began what would become the Rocky Ford Ditch Company. By 1888 the now legally incorporated project owned a ditch sixteen miles long with a capacity to irrigate 10,000 acres. It soon became common knowledge in the region that diverting the Arkansas River was possible.³

Tent camps sprung up where these large irrigation ditch projects were excavated, most often with a large mess tent at their centers. The crews and horses lived collectively in the larger tents, while engineers and foremen had private tents. On the larger projects, thousands of men were employed, utilizing hundreds of horse teams. Ditch cuts were made with devices called wheelers, precursors to modern earth-movers. A portion of the soil to be removed was plowed, then dug out by the wheelers and the smaller scrapers until the desired depth was reached.⁴

In the upper Arkansas River valley, ditch companies followed the lead of mining companies in the establishment of prior appropriation water rights in the region. According to this practice, the earliest claims to water had to be met before later claims could be fulfilled. This could and did become quite complicated in that a company might acquire prior appropriation for a set volume of water in 1871 and then acquire a separate volume in 1882. Meanwhile,

1. Cheyenne Bottoms was designated a "Wetland of International Significance" by the Ramsar [Iran] Convention on Wetlands in October 1988; see www.ramsar.org. Douglas S. Harvey, "Creating a 'Sea of Galilee': The Rescue of Cheyenne Bottoms Wildlife Area, 1927-1930," *Kansas History: A Journal of the Central Plains* 24 (Spring 2001): 3-17.

2. Robert V. O'Neill treats the question of evolving ecosystems in his article, "Is it Time to Bury the Ecosystem Concept (with Full Military Honors, of Course!)," *Ecology* 82 (December 2001): 3279; see also Max C. Thompson and Charles Ely, *Birds in Kansas* (Lawrence: Museum of Natural History, University of Kansas, 1989), 1:10; Richard White, "The Cultural Landscape of the Pawnees," *Great Plains Quarterly* 2 (Winter 1982): 31-40.

3. James Earl Sherow, *Watering the Valley: Development along the High Plains Arkansas River, 1870-1950* (Lawrence: University Press of Kansas, 1990), 12-13.

4. *Ibid.*, 18-19.



The first private efforts at irrigation from the Arkansas River began in Colorado in the early 1870s, and once it became known that diverting the river was possible, large irrigation projects sprung up throughout the region. Pictured here, workers carve out a ditch near Ingalls, Kansas, in 1883 for a project that eventually failed, in part due to the number of other irrigation companies draining water from the river. Other problems plagued the Koen Irrigation Ditch that was dug in the area that would become known as Cheyenne Bottoms in the 1890s, including litigation and the return of wet weather that temporarily lessened the need for irrigation.

another company might establish rights in 1877. The second company's water rights would be fulfilled only after the first company received its first appropriation, while the first company's 1882 appropriation would not be fulfilled until after the second company received its rights. As new municipalities and industries began fulfilling their appropriations, water rights in the Arkansas River drainage became increasingly complicated.⁵

During a wet year, the Cheyenne Bottoms vicinity could receive over thirty inches of rain, more than enough to practice traditional Euro-American-style agriculture. However, feast or famine is the cardinal rule when it comes to Great Plains water, and it is not unusual for fewer than fifteen inches to fall in a year, or even in consecutive years. Droughts are common in the central plains, but it is not unusual for adequate precipitation to fall somewhere in the

region during such times, providing a vital rest and refueling stopover for migratory birds. As Kansas historian A. Bower Sageser wrote, "Even in the worst years there were little islands where the rainfall was sufficient." But the ecology of the region had not been a consideration in determining a course of action in the Arkansas River valley. Water was a commodity, a tool for pursuing individual economic and social gain as well as for establishing and maintaining communities on the High Plains.⁶

The creation of stable communities in the area was a rather late development. As anthropologists and natural scientists of the region have consistently discovered, one of the most universal traits of traditional residents of the High Plains, both human and non-human, has been mobility. A study of American Indian foraging groups such as those found on the central plains before the arrival of Eu-

5. The literature on the "Prior Appropriation Doctrine" and western water law is voluminous. A good starting place is Donald J. Pisani, *Water, Land, and Law in the West* (Lawrence: University of Kansas Press, 1996); Sherow, *Watering the Valley*, includes a summation as it pertains to Kansas.

6. Donald J. Pisani, "Enterprise and Equity: A Critique of Western Water Law in the Nineteenth Century," *Western Historical Quarterly* 18 (January 1987): 15-37; A. Bower Sageser, "Editor Bristow and the Great Plains Irrigation Revival of the 1890s," *Journal of the West* 3 (January 1964): 76.

ropeans showed that on average such groups moved from fifteen to forty times per year with the average move being just over twelve miles. Such a lifestyle was unacceptable to Euro-Americans, who considered it an inferior way of life; it was looked upon with disdain even when practiced by white settlers. Accordingly, the Indian agent George Sibley described settlers who lived nomadic lives on the public domain as

utterly useless to themselves or the States, living chiefly upon the bounties of wild Nature, the Venison and Honey and wild fruits of the Land. They necessarily contract habits of violence & a sort of semi-savage barbarism of manners that in some degree unfits them for the duties of civilised [*sic*] life. They are in short homeless wanderers, and such is the stubbornness of their Nature that they will rather remain as they are than to forego the great privilege of occupying the home of their own free choice.⁷

In the West—in places such as central Kansas—irrigation was seen as a way to establish a lifestyle acceptable to Euro-American colonists.

Indeed, irrigation in the region was facilitated by the Arkansas River's peculiar geography. Rivers that flow out of the Rocky Mountains have carried sediment down from the mountains for eons, and when the water slows as it enters the High Plains, the sediment begins to settle out, leaving a streambed that has a higher elevation than the area surrounding it. Such is the case with the Arkansas River. This means that the river has few tributaries; none of significance flows into the Arkansas in Kansas until the Pawnee River about twenty miles upstream from the Dundee diversion dam that deflects water to Cheyenne Bottoms. Therefore, the water that does not return to the river after being diverted for irrigation in Colorado and Kansas is not replenished except through rainfall in the Arkansas River valley; not a promising situation at this longitude.

However, as the farmers of southeastern Colorado and southwestern Kansas discovered, this "raised bed" phenomenon lends itself quite well to ditch irrigation. In the mid-1890s two Great Bend businessmen, George N. and

Edward R. Moses, initiated a movement to construct a reservoir from Cheyenne Bottoms to collect water during wet years for use when the weather turned dry. To this end the Barton County Irrigation Company was organized on March 23, 1895. With a \$300,000 capital investment, the company "hoped to irrigate potatoes, alfalfa, wheat, barley, fruit crops, and melons," as well as to install a sugar cane mill at Dundee.⁸ All they needed now was someone to dig a ditch from the only large (by central Kansas standards) source of water: the already heavily depleted Arkansas River. A couple of "old time promoters of irrigation enterprises in Colorado," Francis B. Koen and George A. Trites, who had reportedly built the Amity Canal in Powers City, Colorado, were hired to construct a diversion dam and ditch from the river to Cheyenne Bottoms.⁹ After Koen and his new associates ascertained the scope of the project, action was taken, and on December 28, 1896, the Grand Lake Reservoir Company was formed with H. W. Koen, Francis's brother, as president. The company first acquired a trust deed on November 1, 1897, and began soliciting investors. Over the next few months, the McLain Land and Investment Company, a local interest, purchased much of the land that constituted the wetland itself. The Kansas City State Bank and the *Kansas City Times* heard of the project and invested in it as well.¹⁰

Actually, by this time interest in the long-term promise of irrigation had been on the rise for at least a couple of decades. Western explorer and naturalist John Wesley Powell's 1878 pronouncement that irrigation was the answer to settling the West inspired farmers, cattlemen, and scientists, as did the ideas of soil scientists such as Eugene Waldemar Hilgard, who argued that the soil in sub-humid and semi-arid climates was superior to that of the moist eastern regions—all it needed was adequate moisture. Land developer and newspaperman William Ellsworth Smythe, for one, made irrigation on the Great Plains a crusade for the salvation of humankind. The activity around Garden City had established the practice of ditch irrigation in Kan-

8. Leon McKinney, "The Koen Ditch," manuscript, 1968, Great Bend Public Library, Great Bend, Kansas, 1; Duane F. Johnson et al., *Great Bend, Kansas: A Historical Portrait of the City. Centennial Celebration, July 1 through July 8, 1972* (Great Bend, Kans.: Centennial Book Committee, 1972), 24.

9. "Barton County Kansas," *Irrigation Era*, April 1898, 10; Johnson et al., *Great Bend, Kansas*, 24.

10. Abstract of Title No. 10001, "To the Following Described Real Estate Situated South of the Base Line and West of the Sixth Principal Meridian in the County of Barton and State of Kansas: All of Section Thirty-one (31), Township Eighteen (18), Range Twelve (12), Tract No. 51" (Great Bend, KS: Barton County Abstract and Title Company, n.d.), 21–22, 70 (hereafter cited as "Abstract of Title"). The abstract is held at the Barton County Abstract and Title Company in Great Bend.

7. Sibley quoted in William E. Unrau, *The Kansa Indians: A History of the Wind People, 1673–1873* (Norman: University of Oklahoma Press, 1971), 106; for a corrective to an older view of traditional High Plains cultures, see LuAnn Wandsnider, "Late Prehistoric High Plains Foragers: Starving Nomads, Affluent Foragers?" *Great Plains Research* 9 (Spring 1999): 16. Regarding an insistence on maintaining a lifestyle comparable to eastern North America in western Kansas, see Robert J. Irvine, "Putting the Water to Work: A History of Kansas Water Law and the Environment" (PhD diss., Kansas State University, 1997), 80.



In the mid-1890s two Great Bend businessmen, George and Edward R. Moses, initiated a movement to construct a reservoir from Cheyenne Bottoms to collect water for irrigation. To this end the Barton County Irrigation Company was organized and with a \$300,000 capital investment the company hoped to water the region's crops, including potatoes, alfalfa, wheat, barley, fruit crops, and melons. The company did not succeed in its efforts, though its aims surely appealed to the rural residents of Barton County, such as those pictured here making hay near Ellinwood, east of Great Bend.

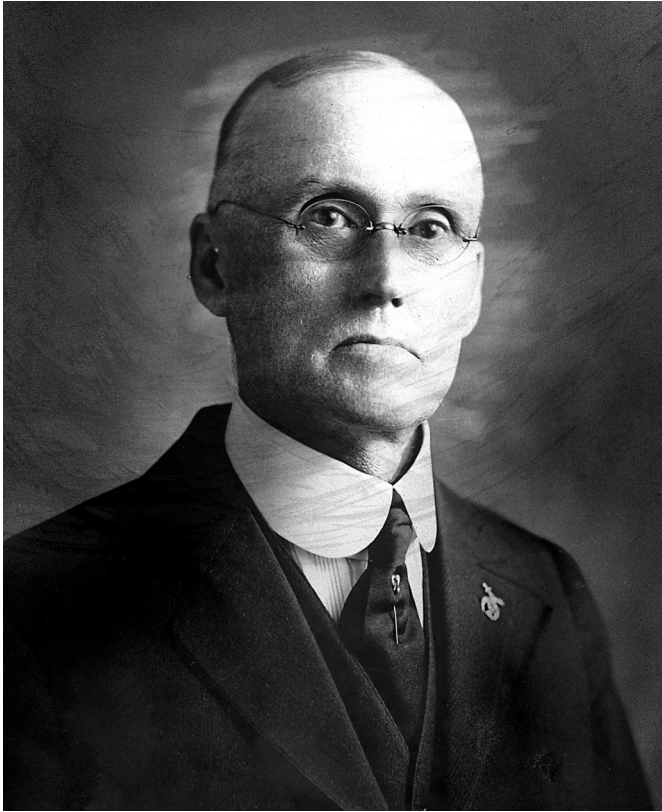
sas and the availability of land heightened interest. But the boom of the 1880s became the bust of the 1890s, and the population in western Kansas declined from over 81,000 in 1889 to under 50,000 in 1895. Dry land farmers were having problems throughout the region, and cash flow was an increasingly serious issue. Many believed irrigation could reverse the trend.¹¹

Not surprisingly, numerous individuals and organizations joined the irrigation crusade. Among them was Edward R. Moses, who, along with working to establish the Barton County Irrigation Company, was named president in the early 1890s of the executive committee of the National Irrigation Congress, a newly formed organization dedicated to watering the West. Moses was also president of the Interstate Irrigation Association, founded in Salina in 1893, and a successful lobbyist, according to Sageser, "for state and federal assistance in the survey of water resources

and the need for the creation of conditions that would secure a *permanent population* for the arid West." Moses was critical of individuals who came onto the plains expecting instant riches. He was willing to work at staying in the region, and his dedication to the Koen ditch was an indication of his desire to make the "Great American Desert" bloom like the savannahs of Missouri and Illinois. Kansas journalist and politician Joseph Little Bristow, who purchased the *Salina Daily Republican* in 1890 and launched the short-lived *Irrigation Farmer* in 1894, joined Moses in a vigorous effort to promote irrigation and thus central plains settlement. Bristow founded some forty local irrigation societies in Kansas, and the year 1895 saw 1,335 farmers irrigating 11,823 acres in the state. Bristow's activities as well as his political connections attracted national attention, and, with the election of William McKinley to the presidency in 1896, Bristow was appointed to a position in the federal government. In the meantime, he had purchased the *Ottawa Herald*, whose editing duties he turned over to Henry J. Allen. Ironically, Allen became a crusader for Cheyenne Bottoms during his short stint as a U.S. senator from Kansas in 1929 and 1930.¹²

11. John Wesley Powell's *Report on the Lands of the Arid Region of the United States, with a More Detailed Account of the Lands of Utah with Maps* (Washington, D.C.: Government Printing Office, 1878), outlined new ways to divide lands for settlement according to watershed boundaries. He also recommended four section homesteads (2,560 acres), instead of quarter sections (160 acres). Congress ignored these recommendations, although the report influenced other policies. See Richard Manning, *Grassland: The History, Biology, Politics, and Promise of the American Prairie* (New York: Penguin Books, 1995), 105–7; Sageser, "Editor Bristow," 77.

12. Sageser, "Editor Bristow," 78 (quotation; emphasis in original), 81, 85, 88; Harvey, "Creating a 'Sea of Galilee,'" 8, 15.



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Ditch irrigation, which had begun at Garden City, spread downstream during the 1880s. Kinsley and Larned, communities not far from Cheyenne Bottoms, both developed ditches from the Arkansas for irrigation as well as for waterpower. In 1900 a condemnation commission was formed in Barton County to select lands for the "purpose of building and maintaining an irrigation ditch or canal heading from the Arkansas River to what is now known as Cheyenne Bottoms."¹³ In May 1899 government surveyors were laying out what was expected to be the Bottom's high water line, which would leave portions of the wagon road between Great Bend and Hoisington underwater. As would be done nearly fifty years later, a ditch was constructed from Wet Walnut Creek to take advantage of the spring floodwaters while the main ditch from the Arkansas was being con-

structed. In April 1900 the commissioners began laying off lands for condemnation. The remaining U.S. government lands were condemned and obtained for \$1 per 160 acres. A contract for irrigation was made between the newly named Lake Koen Navigation, Reservoir, and Irrigation Company and Francis Koen for \$1 for all water rights.¹⁴

By this time, construction had been completed on the canal from the Arkansas River to the Bottoms. According to documented oral history reports, men were paid \$1.50 a day but charged \$5 a week for board. Employees were usually transients, with up to sixty men at a time working on the ditch. Seventy-five teams were employed in the construction and two hundred horses and mules were brought in to be broken for the task. Optimism was rampant as Koen flattened the east bank of the ditch, ostensibly to accommodate a railway that would bring tourists flocking to enjoy the luxurious beachfront hotels at "Grand Lake."¹⁵ Such optimism leapt from local newspapers, which declared that "[f]igures can scarcely express the great benefit that it [the ditch] will bring to Barton County and her people." A local cigar maker, L. C. Miller, began turning out a new brand of cigar dubbed the "Lake Cheyenne." The local press stated that the new stogies would "sail quickly into favor." As for dissent, there were "kickers" but, the papers suggested, "let them kick until they drown in the great Lake Cheyenne." As construction proceeded, locals watched in anticipation as the Bottoms slowly filled. The rains of June brought the water level up to its fullest in ten years, according to one report. Another source claimed that there were a number of lakes in the Bottoms area including one that was "miles across."¹⁶

Land values were expected to rise from \$10 to \$15 an acre to \$75 to \$100 an acre. The project enjoyed recognition by the *Irrigation Era*, a Denver periodical that devoted a cover story to it in April 1898: "The plan is entirely practical . . . we see nothing . . . to cause its failure."¹⁷ The company printed a prospectus showing a resort lake with hotels and lake steamers soon to become reality on the eastern edge of the High Plains of Kansas. When the canal was finally com-

14. Abstract of Title, 58, 60–62, 64, 70. The name of the company was changed on May 8, 1899. See also *Barton County Democrat and the Great Bend Tribune*, May 19, 26, 1899.

15. Railroads were advocates of tourism in the West during the late nineteenth and early twentieth centuries and promoters thought "Grand Lake" would be another good fit. See Michael P. Malone and Richard W. Etulain, *The American West: A Twentieth Century History* (Lincoln: University of Nebraska Press, 1989), 42–43. McKinney, "The Koen Ditch," 1–2; see also *Irrigation Era*, April 1898, 10. McKinney's source for the construction information was Jake Ratzlaff, who claimed to have been one of Koen's drivers.

16. *Barton County Democrat and the Great Bend Tribune*, April 24, May 26, June 9, 1899; statement made to editor by W. W. Turrell of Hoisington, June 23, 1899.

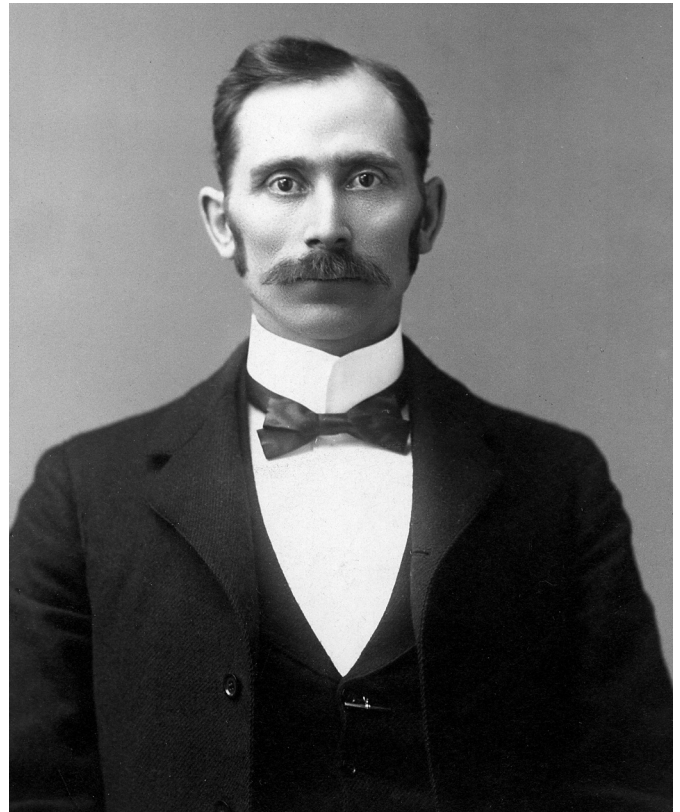
17. *Irrigation Era*, April 1898, 19.

13. Abstract of Title, 56; H. Craig Miner, *West of Wichita: Settling the High Plains of Kansas, 1865–1890* (Lawrence: University Press of Kansas, 1986), 184.

pleted, water from the Arkansas River created a waterfall that spilled into the Bottoms for “about one hundred days.” A project to install a waterwheel for the generation of electricity was considered but never developed. After the hundred days, when the sound of Arkansas River water gushing into the Bottoms was reduced to a trickle, the seventeen feet of water for which the investors had hoped proved to be a pipe dream. Koen’s vision of hotels, boathouses, and steamboats plying the waters of “Lake Cheyenne” came to naught. To add insult to injury, a great storm came through the area and washed out the diversion dam on the river and caused breaks in the ditch, flooding cropland and generating an inundation of litigation. Meanwhile, “Grand Lake” was all of two feet deep.¹⁸

That was only the beginning of the Lake Koen Company’s troubles. During its search for investors, the company had issued \$20,000 in bonds on November 1, 1897, and \$180,000 on July 1, 1902—the latter of which apparently found few takers. Perhaps the *Great Bend Tribune* was correct in its 1941 assessment that the Koen project had been more interested in acquiring investors than in achieving results.¹⁹ Farmers’ fields were flooded, bridges that were constructed over the ditch were not strong enough to accommodate threshing machines, and workers had to track down Koen to get their pay. In the end the “lake” remained what it had always been, a seasonal wetland, and F. B. Koen was on his way to Arizona or perhaps Texas, no one seemed certain. The Lake Koen Company defaulted on all its bonds and the U.S. Circuit Court for the District of Kansas, Second Division, which was located in Wichita, appointed a special master, J. F. Sherman, to oversee the liquidation of the company’s assets.²⁰

Much of the company’s property was initially sold at auction to the Century Investment and Building Company and the U.S. & Mexico Trust Company. McLain Land and Investment Company, one of the original investors in the Grand Lake project, eventually sued over a question regarding quiet title and was awarded some of the lands in



Kansas journalist and politician Joseph Little Bristow, who purchased the *Salina Daily Republican* in 1890 and launched the short-lived *Irrigation Farmer* in 1894, worked vigorously to promote irrigation and thus central plains settlement, founding some forty local irrigation societies in Kansas. Bristow’s activities as well as his political connections attracted national attention, and, with the election of William McKinley to the presidency in 1896, Bristow was appointed to the position of assistant postmaster general. Bristow also served as a U.S. senator from Kansas from 1909 until 1915.

December 1910 by James Clayton, the judge appointed to the case. McLain Investment had held the mortgage from the Lake Koen Company’s first bond issue, and the U.S. & Mexican Trust Company held the mortgage on the second, larger bond issuance. In the brief filed by the lawyers for the Century Investment Company, it was stated that the company was planning to continue the irrigation project, but the award of lands to McLain seems to have ended that scheme.²¹

The motivation to make “Lake Cheyenne” into a reservoir for irrigation and recreation appears to have died with the Koen ditch project. Commercial, subsistence, and recreational hunters had always been active in the area, and the next couple of decades saw an evolution in the power

18. *Barton County Democrat and the Great Bend Tribune*, May 19, 1899; McKinney, “The Koen Ditch,” 2–3.

19. “Named after Indians,” *Great Bend Tribune*, in “Barton County” clippings, vol. 3, 1941–1953, 39, Library and Archives Division, Kansas Historical Society, Topeka. Oral history source G. P. “Pearl” Amerine claimed that the company officials would invite eastern investors to view the work in progress and open the diversion gate from the Arkansas River a few days before they arrived. See McKinney, “The Koen Ditch,” 6. This is substantiated by an *Irrigation Era* article on “Grand Lake Reservoir,” which claimed that water was overflowing in the canal in 1898 and only seven miles had been completed. *Irrigation Era*, April 1898, 10.

20. McKinney, “The Koen Ditch,” 2, 6; Abstract of Title, 74–77. McKinney’s source on workers’ attempts to collect their wages was G. P. Amerine, who claimed that he had to block the road with his buggy to stop Koen and get his pay.

21. Abstract of Title, 83, 92.



Once activists had secured state legislation in 1930 preventing the drainage of the Bottoms, efforts to obtain funds to buy the land and preserve it began, but a dozen years passed before the Kansas Forestry, Fish, and Game Commission (KFFGC) made its first significant land purchases. In 1941 KFFGC Chairman Lee Larrabee, pictured here, met with officials from various divisions of state government and the U.S. Fish and Wildlife Service to discuss preserving the Bottoms as a game refuge.

struggle between those who supported game protection legislation and those who opposed it as they vied for control of Kansas state fish and game policies. In 1897 an act had been passed regulating hunting and prohibiting altogether commercial hunting. An amendment to the law in 1905 gave the state game warden unprecedented powers to inspect the area where the game was being taken and impose bag limits. This seems to have brought an end to commercial hunting at Cheyenne Bottoms, at least in its legal form.²²

The struggle over fish and game policy as it related to the Bottoms came to a head in August 1927. That month a cloudburst upstream from Cheyenne Bottoms filled the bowl to overflowing, creating an ephemeral lake of about sixty-four square miles that State Game Warden Burt Doze called a "Sea of Galilee." It was this event that triggered efforts to preserve the Bottoms as a "shooting grounds" for duck and geese hunters, and the Kansas Forestry, Fish, and Game Commission (KFFGC) began its oversight of the area. Farming interests that had planned to drain Cheyenne Bottoms found themselves up against state power

brokers who embraced progressive conservationist thinking, supplanting the laissez-faire notions of the nineteenth century.²³ Even given their commitment to a new method of managing the Bottoms, it took the KFFGC fifteen years to secure funding approval from the United States Bureau of Biological Survey, in part because certain individuals in the federal organization remained unconvinced that there was adequate water in central Kansas to maintain the proposed 11,000 acre lake.²⁴ At the time no approved plan of development or management existed. It was assumed that if water could be brought to Cheyenne Bottoms, the per-

23. Harvey, "Creating a 'Sea of Galilee,'" *passim*. For studies on game laws of this period, see Thomas Lund, *American Wildlife Law* (Berkeley: University of California Press, 1980), 21–27; William T. Hornaday, *Thirty Years War for Wildlife: Gains and Losses in the Thankless Task* (Stamford, Conn.: Permanent Wildlife Protection Fund, 1931), 98, 141. For a brief summary of this material as it relates to Kansas in this period, see Douglas S. Harvey, "Drought Relief Delayed by Rain: A History of Cheyenne Bottoms Wildlife Area" (Master's thesis, Wichita State University, 2000), 59–65.

24. "Cheyenne Bottoms," in *Second Biennial Report, 1928*, by Kansas Forestry, Fish and Game Commission (Topeka: Kansas State Printing Plant, 1928), 32–35; Marvin Schwilling, "Cheyenne Bottoms," *Kansas School Naturalist* 32 (December 1985): 5; Marvin Arth, "Cheyenne Bottoms Is Biggest Game Refuge in Country," *Great Bend Daily Tribune*, 75th Anniversary Edition, August 10, 1951. The KFFGC is now Kansas Department of Wildlife and Parks (KDWP); the Bureau of Biological Survey is now the U.S. Fish and Wildlife Service.

22. Kansas *Laws* (1897), ch. 135; Kansas *Laws* (1905), ch. 267.

ceived “problem” of the wetland periodically drying up would be solved.

Once activists had secured state legislation in 1930 preventing the drainage of the Bottoms, efforts to obtain funds to buy the land and preserve it began, but a dozen years passed before the KFFGC made its first significant land purchases.²⁵ In 1941 KFFGC Chairman Lee Larrabee, Commission Attorney B. N. Mullendore, and Chief Engineer of the Division of Water Resources of the Kansas State Board of Agriculture George S. Knapp met with officials from the U.S. Fish and Wildlife Service. They discussed the prospect of acquiring Cheyenne Bottoms as a joint state-federal project and agreed that, if established, the state would have ultimate jurisdiction over the game refuge. A year later the KFFGC petitioned the U.S. Bureau of Biological Survey for federal money made available by the Pittman-Robertson Act of 1937—legislation that earmarked funds from an excise tax on guns and ammunition for conservation purposes. M. O. Steen, regional inspector of the Federal Aid Division, Department of the Interior, and Guy D. Josserand, director of the KFFGC, inspected the proposed areas “preparatory to submitting proposals” for Pittman-Robertson funds, which were awarded on a prorated basis determined by the area in question and the number of hunting licenses issued there.

The Kansas application requested funds in order to acquire land, as well as to divert Walnut Creek below the Missouri-Pacific Railroad right-of-way into the Bottoms. Remnants of the old Koen ditch were to be employed to channel water from an Arkansas River diversion dam to Walnut Creek and subsequently into the wetland. This “development” was needed because, as the commission reported in 1942, “Cheyenne Bottoms as it now stands is a marshy type of land annually attracting thousands and thousands of migratory waterfowl to its basin It is not now suitable as a wildlife refuge or breeding ground because of the uncertainty of its water supply.” The only hard data available to the commission as it worked to cultivate Cheyenne Bottoms as a wildlife breeding and hunting grounds was a study on the region’s rainfall and stream flow done by George Knapp in 1934. While Knapp was a veteran of the court battles with Colorado over Arkansas River water, his study was based on a mere twelve years of record-keeping and could not anticipate the consequences of the proposed changes to the Bottoms’ ecosystem. All the same, funds

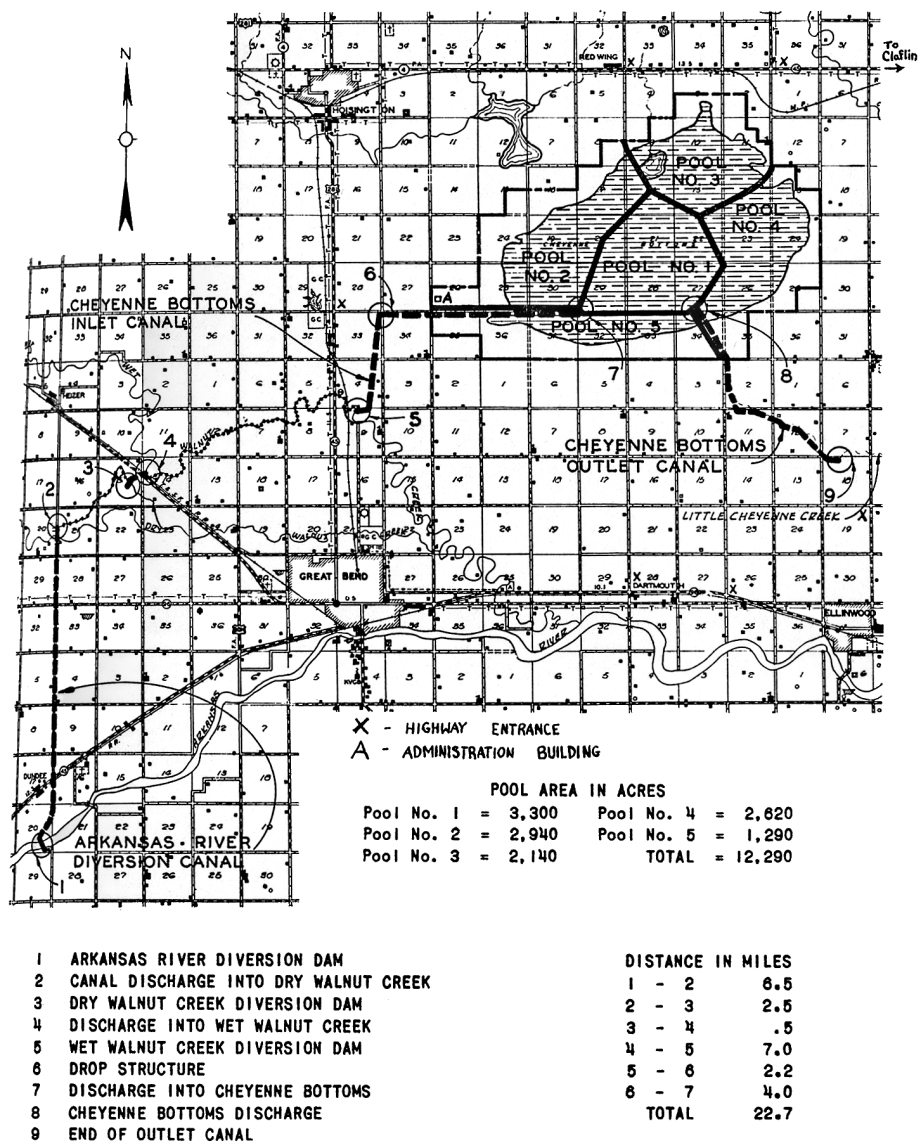
awarded to the commission in 1942 allowed land acquisition to begin, and by November the state had acquired 6,800 acres for \$7.91 an acre. By September 1948 all the land in the immediate basin—over 18,000 acres—had been purchased for \$410,965.57, with the Pittman-Robertson Fund accounting for \$308,224.16 of the total cost.²⁶

In the autumn of 1948, the state of Kansas contracted Murray Wilson of Wilson & Company Engineers of Salina, Kansas, to draw up a proposal for another ditch to Cheyenne Bottoms. Wilson had supplied KFFGC with engineering recommendations throughout the period when the agency was lobbying for federal money. When title to the Cheyenne Bottoms land was at last secured, the proposal was submitted and the first phases approved by the Bureau of Biological Survey. Wilson’s plan was described as a “proposed method of developing the Cheyenne Bottoms as a refuge and public shooting ground for migratory waterfowl.” The combination of “refuge and public shooting ground” is a reminder that local support was nurtured by the dual motives of improved duck hunting and the chance to separate the subsequent increased numbers of hunters from their money. The plan itself was six-fold: 1) construct an inlet canal from Wet Walnut Creek to the Bottoms; 2) build a diversion dam on Wet Walnut Creek with control gates; 3) construct an outlet canal to Little Cheyenne Creek with control gates; 4) dig a ditch from the Arkansas River to Dry Walnut Creek and thence to Wet Walnut Creek; 5) erect a diversion dam on the Arkansas River with adequate control gates; and 6) construct a system of dikes and other control structures within the basin itself. Total cost was estimated at \$1,371,000.²⁷

26. “Cheyenne Bottoms,” *Kansas Fish and Game* 3 (October 1941): 2; “Cheyenne Bottoms,” in *Ninth Biennial Report, 1942*, by Kansas Forestry, Fish and Game Commission (Topeka: Kansas State Printing Plant, 1942), 7; “Pittman-Robertson Funds,” *Kansas Fish and Game* 2 (May 1940): 4; “The Game Commission Plans An 11,000-Acre Lake,” *Kansas Fish and Game* 4 (October 1942): 2–3; “The Opinion of the Editors [Topeka Daily Capital],” *Kansas Fish and Game* 4 (November 1942): 3; “Division of Federal Aid to Wildlife Restoration Projects: The Pittman-Robertson Program,” in *Thirteenth Biennial Report, 1950*, by Kansas Forestry, Fish and Game Commission (Topeka: Kansas State Printing Plant, 1950), 45, 44–47.

27. Wilson and Company Engineers for State of Kansas Forestry, Fish and Game Commission, “The Cheyenne Bottoms: The Proposed Development as a Waterfowl Refuge,” October 1948, 1, 3–4, Pratt office, Kansas Department of Wildlife and Parks, Pratt, Kansas; Reed F. Morse, “A Water Supply for the Cheyenne Bottoms as a Game Refuge,” in *Kansas Engineering Society Year Book, 1935* (Manhattan, Kans.: Kansas Engineering Society, [1935]), 18; Robert Irvine, “The Waterscape and the Law: Adopting Prior Appropriation in Kansas,” *Kansas History: A Journal of the Central Plains* 19 (Spring 1996): 30–32.

25. See “The Cheyenne Bottoms,” in *Twelfth Biennial Report, 1948*, by Kansas Forestry, Fish and Game Commission (Topeka: Kansas State Printing Plant, 1948), 19–22, published several years after much of the land had been obtained; and Harvey, “Creating a ‘Sea of Galilee,’” 17.



When title to the Cheyenne Bottoms land was at last secured and plans for its development as a refuge and public shooting grounds for migratory waterfowl were approved, construction began. The plan was six-fold and, as is shown in this map published in the January 1958 issue of *Kansas Fish and Game*, included the construction of various inlets and outlets to nearby creeks, diversion dams with control gates, and a system of dikes and other control structures within the basin itself. Total cost was estimated at \$1,371,000.

The proposed water level was set at 1,795 feet above sea level, which would create an impoundment of 13,300 acres with a maximum depth of four feet and an average depth of two feet. The Wilson proposal used Knapp's 1934 report, which had been compiled fourteen years earlier and, as mentioned above, was based on only twelve years of accumulated data. According to these figures, it would be possible to obtain a total of 700 cubic feet of water per second: 200 from Wet Walnut Creek and 500 from the Arkansas River. Knapp's estimates showed that, given the rainfall

from October 1922 to October 1933, the water in Cheyenne Bottoms would never fall below an area of 10,500 acres or rise above 15,900 acres. He believed that during the twelve-year study period enough rain fell to have refilled the Bottoms five times. It was at this time that KFFGC applied for and received water rights on Walnut Creek from the Kansas Division of Water Resources, a fact that would prove crucial decades later.²⁸

28. Wilson and Company Engineers, "The Cheyenne Bottoms," 1-2.

There was no apparent reason not to proceed with the development plan. On May 6, 1949, contracts were let for the inlet canal from Wet Walnut Creek and the bridges over it. Milton Reinhardt and Sons of Russell was awarded the contract for constructing the three-and-a-half-mile long canal that originated one-half mile east of Highway 281 on Wet Walnut Creek. Reinhardt was also building a new concrete highway between Great Bend and Hoisington at the time. The contract for the four wooden and concrete bridges needed for county and township roads bisected by the canal went to T. F. (Thomas Fiske) Marbut Construction Company of Emporia. Reinhardt's low bid was \$92,420.18; Marbut's was \$46,285.42, for a total of \$138,705.60.²⁹

The project was plagued by delays from the outset. First, there were problems acquiring the right-of-way for the canal. Then contractors had to await a U.S. Fish and Wildlife Service review and its subsequent recommendations. When these were made, chief among them was the employment of more extensive diking throughout the Bottoms. Two reasons were given for this: water levels would be easier to control if the water was stored in smaller pools, and federal officials had learned the hard way at the Bear River Salt Marsh in Utah that large areas of stagnant water promoted duck botulism. These recommendations, bypassed because of costs, would be revisited after managers and commissioners learned the hard way that, indeed, smaller pools and more extensive diking were necessary at Cheyenne Bottoms.

When the right-of-way issues were resolved, high water delayed efforts to get into the main pool area and construct the dikes. By April 1950, however, the KFFGC reported that the inlet canal from Walnut Creek and the bridges over it were almost complete, even though construction of the canal had been delayed by a cold January and a lack of moisture in the soil, which made the frozen ground difficult to excavate. But with warmer weather the diversion dam on Walnut Creek was soon underway and the estimated two hundred days to complete the structure seemed adequate until rain again slowed progress.³⁰

Meanwhile, in anticipation of the improved hunting and fishing that was expected with the management project, the Cheyenne Bottoms Sportsmen's Association, Inc., was organized on June 13, 1950. An eleven-man board of directors was established, George Scheufler of Great Bend was elected president, and dues were set at \$5 a year. The board

included men such as Frank Robl, whose duck-banding hobby had done much to further knowledge of the patterns of migratory fowl at Cheyenne Bottoms, and F. Sharon Foster, the Wilson and Company engineer in charge of construction at Cheyenne Bottoms. Foster supplied the press with statistical information about the project, the size of which was surpassed only by the Army Corps of Engineers dam and reservoir construction projects in Kansas. Construction of the inlet canal, Foster noted, would require an embankment using 35,149 cubic yards (yds³) of material; 371,205 yds³ of soil had to be removed; 3,284 yds³ of rock excavated; 2,710 feet of linear grading done; and 38,931 yds³ of ground stripped of soil.³¹

By 1953 water was being diverted from the Wet Walnut Creek drainage into the Cheyenne Bottoms basin. A dry 1952, while frustrating for the chafing duck hunters, had allowed diking in the Bottoms itself to proceed and bids were being taken for the Arkansas River diversion dam. The KFFGC reported in April that the Cheyenne Bottoms project was 75 percent complete. Agency director Dave Leahy optimistically estimated that the project would be completed by early 1954. The big question, as pointed out by a sportswriter for the *Pratt Daily Tribune*, was whether or not there would be enough rain to fill the Bottoms. "In its natural state, Cheyenne Bottoms was a wonderful waterfowl refuge. Just how successful it will be under the new program remains to be seen . . . [w]ill it," the author asked, "remain wild enough?"³²

Expectations were very high in regard to the new management plan at the Bottoms. The rains returned in the summer of 1953 and put the new Wet Walnut diversion dam to the test. Seepage was a problem immediately in the dirt-bottomed canals, but KFFGC put a positive spin on it by correctly pointing out that the hard clay of the Bottoms kept seepage to a minimum—once the water was actually in the basin itself. It also began to be apparent to observers that evaporation was claiming much of the incoming water. The commission minimized the impact of this problem on public opinion by pointing out that the twenty-three miles of dikes recently constructed in the basin would allow "complete water control" within the confines of the Bottoms. By August, channel catfish were being moved from Kanapolis Reservoir near Salina into Cheyenne Bottoms.³³

31. "Map, Pictures Tell Story of Progress," *Great Bend Daily Tribune*, May 24, 1950; *Great Bend Herald*, June 15, 1950.

32. *Pratt Daily Tribune*, August 3, 1953; Hugh Jencks, "The Cheyenne Bottoms," *Kansas Fish and Game* 10 (April 1953): 6–9. Jencks, a reporter with the *Great Bend Tribune*, wrote that hunting and recreation would attract people from throughout the Midwest and "mean a lot of money in Barton county cash registers" (6).

33. "Summer Rains in Cheyenne Bottoms Area Cheer Sportsmen," *Kansas Fish and Game* 10 (October 1953): 3; "Young 'Channels' Moved to Cheyenne Bottoms," *Wichita Eagle*, August 31, 1953.

29. "Bottoms Contracts Let At Pratt," *Great Bend Daily Tribune*, May 7, 1949.

30. "Cheyenne Bottoms," *Kansas Fish and Game* 7 (July 1949): 4; "The Cheyenne Bottoms," *Kansas Fish and Game* 7 (April 1950): 1.

Attention given to the duck hunting possibilities at Cheyenne Bottoms also focused Kansas hunters on other likely “shooting grounds” in the state. Of special interest was the “Great Salt Marsh” that would become Quivira National Wildlife refuge, just south of the Bottoms, and the Marais des Cygnes River and wetlands in Linn County. The press heightened the anticipation and optimism of most Kansas hunters. The *Wichita Eagle* headline in October 1953 is quite revealing in this regard: “Kansas Slated to Be No. 1 Duck Hunting State.” It was generally believed that Kansas was primarily a fly-over for migrating game birds, that they did not stop in the area for long, and that development of Cheyenne Bottoms would be necessary to maintain a resident population of game birds.³⁴ Perhaps this is one reason why the protection and/or development of the majority of the state’s wetlands had not been seriously considered. At any rate, the fall 1953 hunting season—seen as the new project’s first—was deemed a success. The rains from the previous summer had afforded some water for the migratory birds and dike construction had been combined with the manufacture of 167 hunter blinds to allow area hunters to at last feel like they were reaping the benefits of the new project.

KFFGC officials were quick to note, however, that hunting was only a “minor phase” at Cheyenne Bottoms, and that “fishing, boating, and other recreational sports” would become important during the summer months. The commission’s rhetoric began to sound like that used by proponents of the old Koen ditch. But to its credit, the KFFGC maintained a focus on the welfare of the migratory birds themselves: “As more and more of waterfowl’s natural breeding areas in Canada and northern states are destroyed, as more and more wintering grounds in the South are reclaimed, the need for restoring such areas in the Midwest is necessary, if we are to maintain waterfowl populations.”³⁵ And yet, the dichotomy of purpose was apparent: “The principal value of waterfowl refuge projects lies in the great number of ducks and geese which will remain in this state instead of passing on through to areas where water and feed are abundant.”³⁶

The underlying premise of this line of thinking was to facilitate those who wanted to lie in wait for an opportunity to shoot those ducks and geese. In 1953 there were an estimated eight thousand duck hunters in Wichita alone, and

the greater part of these expected the management project at Cheyenne Bottoms to result in more ducks in their freezer. This sentiment was echoed throughout the region, but perhaps was put most succinctly in a 1942 *Stafford Courier* news item: the Bottoms will “afford an immense reservoir of ducks which certainly would circle over this area and give everybody some shooting.” The *Hutchinson News* published an article in 1954, which proved to be prescient. Noting the construction proceeding on the diversion of water from the Arkansas River to the Bottoms, the article stated that “a constant supply of water can be assured for Cheyenne Bottoms . . . if the river doesn’t go completely dry.”³⁷

The complexity of Cheyenne Bottoms’ natural cycles started to become apparent well before the completion of the project. After the initial diversion of water into the basin, erosion of the dike structures within the main pool became a problem. By July 1954 salt grass or coarse gravel were put forth as possible solutions to wave damage, which had taken as much as two feet of soil from the embankments.³⁸ This problem was not mentioned in the KFFGC publications of the period. The third phase in the construction of Cheyenne Bottoms was the outlet canal. This was completed in short order at a cost of \$36,385.97, which included bridges over the canal and Little Cheyenne Creek that drained the Bottoms in times of high water. Like the rest of the project, 75 percent of this expense was covered by Pittman-Robertson funds acquired from an 11 percent excise tax on guns and ammunition.³⁹

By January 1955 negotiations were underway to acquire right-of-way for the inlet canal that would flow out of the Dundee Diversion Dam to be constructed on the Arkansas River. Plans for this phase were approved in July 1956 and contracts for construction were awarded. Total land acquisition for the inlet canal was 238 acres; the total cost was \$132,311.09—a figure many times more than the “unreasonable” land prices Barton County landowners were asking twenty-two years earlier, even after adjustment for inflation.⁴⁰ The bulk of canal construction was from Dundee Diversion Dam on the Arkansas to the north fork of

34. “Kansas Slated to Be No. 1 Duck Hunting State. Three Huge Projects—One Near Completion—to Make Regional Waterfowl Paradise,” *Wichita Sunday Eagle*, October 18, 1953.

35. “Cheyenne Bottoms Refuge Fulfills Expectations,” *Kansas Fish and Game* 11 (January 1954): 12.

36. “Kansas Slated to Be No. 1 Duck Hunting State,” *Wichita Sunday Eagle*, October 18, 1953.

37. *Hutchinson News-Herald*, October 19, 1954; “The Opinion of the Editors,” editorial from (Stafford, Kansas) *Courier* quoted in *Kansas Fish and Game* 4 (November 1942): 4.

38. Murray Wilson to Dave Leahy, July 7, 1954, 1950s Correspondence file, Kansas Department of Wildlife and Parks Archives, State Headquarters, Pratt, Kansas (hereafter cited as “KDWP Archives”).

39. “Fish and Wildlife Restoration in Kansas,” in *Fifteenth Biennial Report*, 1954, by Kansas Forestry, Fish and Game Commission (Topeka: State Printing Office, 1954), 57–60.

40. “Cheyenne Bottoms Project,” in *Sixteenth Biennial Report*, 1956, Kansas Forestry, Fish and Game Commission (Topeka: [State Printing Office], 1956), 48–49, 51.



The development of Cheyenne Bottoms as a refuge and hunting grounds was plagued by delays from the outset. There were problems acquiring rights-of-way, stoppages when contractors had to await a U.S. Fish and Wildlife Service review and its subsequent recommendations, and setbacks due to wet and cold weather. By April 1950, however, construction had begun in earnest. In the image above a crane is used to build a portion of the project.

Dry Walnut Creek, a seven-mile run. The water would then flow through Dry Walnut to another diversion dam sending it into a canal and down to Wet Walnut Creek. Another diversion dam and another canal would bring the water to the Bottoms. Fourteen thousand feet of the canals were to be open ditch; concrete conduit pipe varying from sixty to seventy-two inches would run for 25,000 feet; the usually dry creek beds would be used for 10,000 feet. Dundee Diversion Dam, the biggest of the three diversion dams, would be 270 feet long with six radial gates. Canal capacity was estimated at eighty cubic feet per second; enough to cover 20,000 acre-feet per year. The added diversion from the Arkansas River would supplement the flow of Walnut Creek, which was thought to be adequate but for evaporation.⁴¹

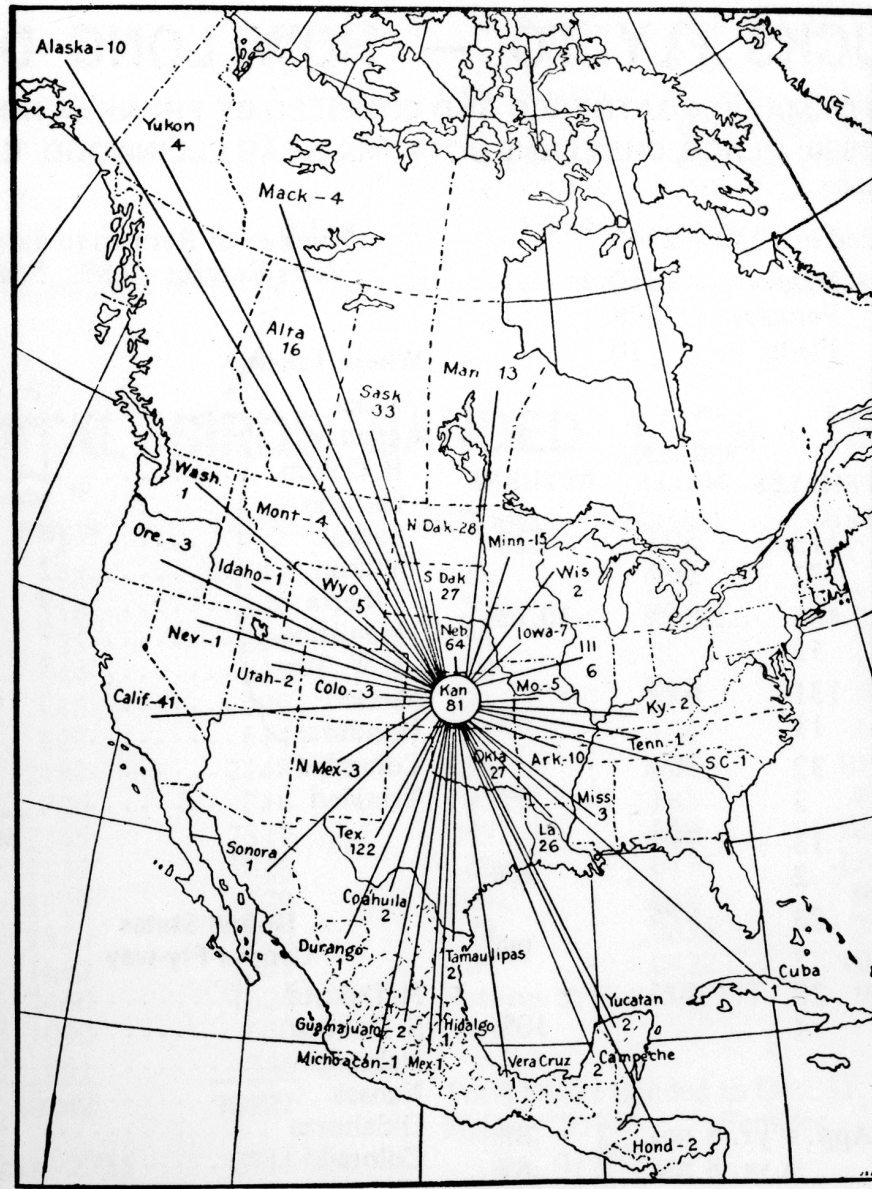
In the fall of 1957, thirty years nearly to the day that U.S. Bureau of Biological Survey officials Talbot Denmead and Seth Gordon recommended pursuing federal assistance (following the August 1927 cloudburst), Cheyenne Bottoms

Game Preserve was ready for dedication. On October 13 area dignitaries assembled together with Governor George Docking, Lieutenant Governor Joseph Henkle, Senator Frank Carlson, and a number of former governors. Robert M. Rutherford of the Department of the Interior gave the dedication speech. The completed Cheyenne Bottoms was now "one of the foremost game refuges on the waterfowl migratory route between the Canadian border and the Gulf area."⁴²

Problems that had begun before construction, however, were already looming larger, as the alteration of the environment had unforeseen consequences. In addition to the erosion problems, the 3,330 acres of four- to five-foot-deep water in Pool 1 at the Bottoms was whipped by the omnipresent Kansas wind into a turbid soup that would no longer sustain the vegetation or invertebrates essential to migratory waterfowl. The consequences of ignoring the

41. "Water from Arkansas River Will Be Diverted Into Cheyenne Bottoms," by *Kansas Fish and Game* 12 (January 1955): 18–19. An acre/foot is the amount of water required to cover a one-acre area one foot deep.

42. "Cheyenne Bottoms Dedicated," *Kansas Fish and Game* 15 (January 1958): 6; "Cheyenne Bottoms Once Battleground for Indian Tribes," *Topeka Daily Capital*, October 6, 1957; "Governors Invited to Wildlife Event," *Kansas City Star*, August 18, 1957, and "Proud Day in Kansas," *Kansas City Star*, October 13, 1957, in "Barton County" clippings, vol. 4, 1953–1972, 128, 132–33, Library and Archives Division, Kansas Historical Society, Topeka; "It's Cheyenne Bottoms Day," *Great Bend Sunday Tribune*, October 13, 1957.



This map, taken from a 1933 bird banding study, shows the origins of the migratory waterfowl that passed through Cheyenne Bottoms. It was the hope of area hunters that the game preserve developed at the site in the 1940s and 1950s would help to maintain a resident population of game birds.

U.S. Fish and Game previous recommendations for smaller pools were coming home to roost. River bulrush, rare in the area at the time of a 1951 report that studied its use, had been planted in an attempt to stabilize the project's dikes. It provided valuable nesting areas for ducks, but eventually grew out of control and began choking off smaller areas of open water, forming dense beds that covered hundreds of acres. Moreover, the continual presence of water in the Bottoms prevented the old pre-development duck foods of

wild millet and smartweed from establishing themselves before the spring and summer rains refilled the Bottoms.⁴³

As for those spring and summer rains, the diversion of Wet Walnut Creek and Arkansas River waters into the Bottoms now meant more water in the wet season as well as the dry. In the spring of 1958, just months after the dedica-

43. Otto W. Tiemeier, "Why Ducks Prefer Cheyenne Bottoms," *Kansas Fish and Game* 8 (April 1951): 7-8; Dave Coleman, "Waterfowl Nesting at Cheyenne Bottoms," *Kansas Fish and Game* 16 (July 1958): 7-9.

tion, KFFGC director Dave Leahy received a letter from a downstream farmer informing him of problems associated with Cow Creek flooding and water released from Cheyenne Bottoms. A number of farmers in that area claimed that water was being released from the Bottoms and thence into Cow Creek via the Little Cheyenne Creek when Cow Creek was already at flood stage. On May 9, 1958, farmer H. H. Heaps wrote to Governor George Docking regarding the thirty-five to forty farmers who had confronted Dave Leahy on May 6 about the flooding of Cow Creek. They claimed that only once, in 1903, had water flowed out of Cheyenne Bottoms to Cow Creek before the outlet canal had been cut.⁴⁴ These water management problems finally convinced Kansas Forestry, Fish, and Game officials that further study of the situation was necessary in order to develop a plan for the newly finished wildlife area. In July 1959 a contract was entered into with the School of Engineering at the University of Kansas to conduct a study on ways to alleviate the erosion, flooding, and turbidity problems.⁴⁵

Probably the most influential item to come out of these studies was the concept of water manipulation. Up to this point, there had been no management plan for the area; it had apparently been assumed that if water was kept moving through the area it would take care of itself. Richard B. Eggen and David C. Coleman, authors of the first management plan, proposed the idea of water manipulation to accomplish the major objective of fulfilling Cheyenne Bottoms' "potential as a *feeding and resting area for migratory waterfowl* of the Central Flyway." The manner in which water levels were handled, the authors wrote, would determine what plants grew in the Bottoms. The drawdown and impoundment of water, and to a lesser extent the stabilization of water levels, were the methods of manipulation proposed. Drawdown would be used for exposing areas for both the natural production and planting of waterfowl foods, drying areas for physical improvements and repairs, and, possibly, for controlling undesirable plant species. Impounding water would maintain a reservoir for irrigating nearby food sources (making them available to waterfowl), improving waterfowl hunting, and also controlling undesirable plants. The study strongly recommended controlling the natural runoff from Blood and Deception creeks to avoid flooding both in and below the Bottoms.⁴⁶

44. H. H. Heaps to Dave Leahy, April 2, 1958; H. H. Heaps to Governor George Docking, May 9, 1958, KDWP Archives.

45. Contract between Kansas Forestry, Fish and Game and University of Kansas School of Engineering, July 25, 1959, KDWP Archives.

46. Richard B. Eggen and David C. Coleman, *Management Plan for the Cheyenne Bottoms Waterfowl Refuge* (Topeka: State Printing Office, 1958), 1, 2.

The practice of water manipulation was to be based upon a level of 1,794.5 feet above sea level on May 15 of each year.⁴⁷ Drawdown would be initiated in Pools 2 and 5 on that date and continue until the water was lowered one foot. Drawdown in Pools 3 and 4 would begin on June 1, when they would be lowered to the same level as Pools 2 and 5. At this point, the water in all the perimeter pools would be lowered until it remained only in the borrow ditches (ditches left after dike construction). This would allow for the growth of food plants throughout the summer in preparation for the fall migration. Pool 1, meanwhile, would act as a water impoundment for the purpose of reflooding in the fall. This reflooding was scheduled to begin on September 15, when water levels would be raised to 1,793.5 feet in Pools 2, 3, and 4 and 1,794 feet in Pool 5. This would provide three to six inches of water in these pools, making the grasses and forbs that had grown up during the summer on dry ground more accessible to waterfowl. On January 1 water levels would be raised to 1,794 feet making more food accessible to wintering ducks and geese. Finally, beginning February 15 the water would be brought back up to 1,794.5 feet—creating a "full pool"—maximizing use of plant foods in the outer areas of the Bottoms and making the most possible food available for spring migration. It was apparent to the plan's authors that not all years would be the same. They made it clear that "it is impossible to foresee and provide for in this plan all contingencies that may arise."⁴⁸

In addition to water manipulation, the 1958 management plan called for nurturing food crops for migratory waterfowl.⁴⁹ Seeding during low-water periods was the primary method of nurturing a dependable food source from the native plant groups proposed in the management plan. Agricultural crops provided a food source for waterfowl as well, and the plan proposed leasing lands not affected by water

47. This level was temporarily kept six inches lower in Pool 5 until structures to protect a pen established for nesting geese were constructed.

48. Eggen and Coleman, *Management Plan for the Cheyenne Bottoms Waterfowl Refuge*, 3–4.

49. The plants listed here are merely a sampling of those included in the management plan. The non-agricultural food crops fell into four classes: 1) Upland plants, or those typical of the mixed-grass environment of the Cheyenne Bottoms area. Grasses included buffalo grass (*Buchloe dactyloides*), blue stems (*Andropogon* spp.), and blue grama (*Bouteloua gracilis*). Forbs included sunflower (*Helianthus* spp.), fireweed (*Kochia scoparia*), Russian thistle (*Salsola pestifer*), and dock (*Rumex* spp.); 2) Wetland plants, which would be unique to an ephemeral wet environment like the Bottoms, included wild millets (*Echinochloa* spp.) and smartweeds (*Polygonum* spp.); 3) Semi-aquatic plants included river bulrush (*Scirpus fluviatilis*), spikerushes (*Eleocharis* spp.), cattail (*Typha latifolia*), and water hyssop (*Bacopa rotundifolia*); and 4) Aquatic plants, or plants that thrive in standing water, included duckweed (*Lemna* spp.), swamp smartweed (*Polygonum coccineum*), and bladderwort (*Utricularia vulgaris*).

A SPORTSMANS PARADISE — BECOMES A REALITY



PROGRAM

**Cheyenne Bottoms
Dedication, Sunday, Oct. 13**

SUNDAY 1:30 P.M.

Ribbon Cutting Entrances

- * US 56 HIGHWAY ENTRANCE
- * K-4 HIGHWAY ENTRANCE
- * US 281 HIGHWAY ENTRANCE
- * AT DAMSITE NEAR DUNDEE

3:00 P.M. Main Ceremony

At 4-H Building on U.S. 281, West Entrance to Cheyenne Bottoms.

MASTER OF CEREMONIES: FORD HARRAUGH, Member, Forestry, Fish and Game Commission.

PROGRAM:
Star Spangled Banner
Brief talk on past history of Cheyenne Bottoms by Ray Carroll
Introduction of dignitaries
Dedications Address by representative of Department of Interior
Music by Barton County High School Bands

**THE PUBLIC IS INVITED
TO A FREE
Buffalo Bar-B-Que**

SATURDAY, OCT. 12
7 P.M.
CITY AUDITORIUM
Great Bend

An Informal Reception for Visiting Dignitaries
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SATURDAY, OCT. 12—8 P.M. to 9:30 P.M.
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The Firms
And Individuals
**WHO HAD A PART
IN MAKING POSSIBLE
THE GREAT CHEYENNE BOTTOMS
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VISITORS TO THE FORMAL DEDICATION SUNDAY

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Drive-In**
JUNCTION 56 and 104

In the fall of 1957 Cheyenne Bottoms Game Preserve was ready for dedication. On October 13 area dignitaries assembled together with Governor George Docking, Lieutenant Governor Joseph Henkle, Senator Frank Carlson, and a number of former governors. Robert M. Rutherford of the Department of the Interior gave the dedication speech and, as seen in this page from the Great Bend Tribune, local businesses congratulated both those who built the preserve and those who would hunt and fish on it.

manipulation or securing state employees to farm the perimeter areas. Crop rotation, strip-cropping, fertilization, experimental plantings, and nursery plots were methods proposed for improving agricultural food crop sources.⁵⁰ Physical developments proposed in the management plan

included "level ditching." This was a process whereby ditches would be dug in the perimeter pools to maintain standing water for nesting waterfowl during drawdown periods. Periphery diking and island construction would enhance water control and ecological diversity in the Bottoms, providing nesting areas for the migrating flocks.⁵¹

50. Eggen and Coleman, *Management Plan for the Cheyenne Bottoms Waterfowl Refuge*, 5-7, 8-9.

51. *Ibid.*, 10-13.

The idea was to minimize wave erosion from large bodies of water and diversify the environment at the wetland.

In addition to land management practices, the 1958 plan proposed wildlife management practices for Cheyenne Bottoms. Proposed studies and surveys included population inventories, brood counts, food habits studies, and surveys of nesting, hunter kills, non-waterfowl species, and vegetation. Trapping and banding of locally raised birds as well as wintering and migrating waterfowl were recommended. While predators were considered to be part of the ecosystem and were not to be eradicated, the plan recommended prevention and control of serious predator threats especially during the nesting season. Control of fish populations was advised, especially for carp, as they could cause damage to waterfowl foods and increase turbidity that would lead to a general decline in water quality. The stocking of game fish at Cheyenne Bottoms was recommended save in the perimeter pools, which would be allowed to go dry on a regular basis. Finally, the plan called for changes to a ninety-six-acre captive-geese-nesting pen, which had been established in Pool 5 in 1956. The biggest problem the nesting project had experienced up to that point was flooding during the wet season. Diking was recommended as a way to provide dry ground during times of high water. The basic concept was to build up a captive nesting population of geese at the Bottoms to attract a free-flying population of nesting geese. The management plan recommended wing-clipping goslings during their first three years to encourage them to nest at Cheyenne Bottoms. If they did not nest, they would be allowed to grow flight feathers for nesting migration during their fourth year.⁵²

Fluctuation of water levels throughout the Bottoms' various pools would hopefully recreate natural cycles of drying and flooding, but the system needed relatively clear water to be effective. The study undertaken by the Kansas University School of Engineering dealt with dike erosion and subsequent turbidity as well as ways to deal with runoff from severe storms. It was recommended that dikes be constructed of small-sized riprap (broken bricks and concrete spoils) or a mix of local sand and cement at a slope of 3:1. An aluminum sulfate compound was hesitatingly recommended for use in reducing turbidity. The expensive compound would combine with soil particles and add to their weight causing them to settle to the bottom making the water more clear. The flooding in Pool 2, which had reached the outskirts of the town of Hoisington, was ad-

ressed by recommending control and distribution of up to 160,000 acre-feet of incoming water flowing at 57,000 cubic feet per second. The release of this incoming water directly into the outlet canal was also proposed by the study.⁵³

These studies represented a turning point in the general attitude towards Cheyenne Bottoms. It was becoming clear to the KFFGC that taming an ephemeral wetland on the High Plains of North America was more complex than digging a ditch and throwing up a few dikes. Adopting these recommendations alleviated the problems at the Bottoms to some degree. But the management plan said nothing of increased water use upstream from Cheyenne Bottoms, nor did it address the prospect of having no water to drawdown, though these issues did eventually arise.

The problems that confronted managers and administrators in the early years of the Bottoms' closely supervised development are emblematic of troubles that arise when an ecosystem is altered. The wildlife that now frequents the Bottoms is of a different character than that of the nineteenth century and earlier. Gone are the herds of bison, elk, and antelope that no doubt relied on this and other wetlands for water and a variety of food plants. In their place are cattle, hog farms, and a different array of waterfowl, upland game birds, songbirds, as well as a large sedentary human population. Humans have sought to control this new ecosystem, and the resulting problems have kept those hired to manage Cheyenne Bottoms quite busy in the last half century. Interestingly, this has placed the Bottoms squarely in the middle of larger debates regarding how best to use land and especially water on the Great Plains. Attempts to develop sustainable practices and priorities by the new human "managers" on the central plains have given rise to unintended consequences and unpredictable problems. Even given the difficulties encountered during its development, however, the water control project at Cheyenne Bottoms has become a symbol for the preservation of a Great Plains ecosystem, albeit one that has been greatly altered in the last century. [KH]

52. *Ibid.*, 14–24.

53. David W. Appel et al., *A Study of the Control of Water at Cheyenne Bottoms Waterfowl Refuge* (Lawrence: University of Kansas School of Engineering, 1961), 2–3.